

LISTING OF CLAIMS

1. (Currently Amended) An apparatus for checking the position of a mechanical part, more particularly a free end of an elongate tool [(3), including] comprising:

[[•]] a frame [(5)], stationary with respect to the mechanical part to be checked,

[[•]] a base [(6)] carrying a mechanical support [(25)], the base [(6)] and the frame [(5)] being [[mutually]] movable with respect to each other along a longitudinal feed direction [(X)],

[[•]] an emitter [(20)] for generating a light beam [(21)] along a trajectory transverse[[al]] with respect to the longitudinal feed direction [(X)], and a sensor [(22)], arranged along the trajectory of the light beam [(21)], the emitter [(20)] and the sensor [(22)] being coupled to the mechanical support [(25)] in mutually defined positions, the sensor [(22)] being adapted for providing signals indicative of [[the]] reception and interruption of reception of the light beam [(21)],

[[•]] a transducer device [(9,10)] for checking the [[mutual]] relative position between the base [(6)] and the frame [(5), and]],

[[•]] a processing, display and control unit [(12)], connected to the sensor [(22)] and to the transducer device [(9,10)], for processing said signals of the sensor [(22)] and for identifying the [[mutual]] relative position between the base [(6)] and the frame [(5) at the]] at said interruption of reception of the light beam [(21)], and

[[characterized in that the apparatus includes]] a coupling mechanism [(24)] between the mechanical support [(25)] and the base [(6)] adapted for enabling oscillations of the light beam [(21)] with respect to the base [(6)] substantially along a [[transversal]] reference surface, and [[the apparatus further including]] an activation device [(26)] and transmission elements [(29,30)] adapted for controlling said oscillations of the light beam [(21)] with respect to the base [(6)].

2. (Currently Amended) The apparatus according to claim 1, wherein the coupling mechanism [(24)] and the transmission elements [(29,30)] enable oscillations of the light beam [(21)] in a delimited area [(33)] of said reference surface.

3. (Currently Amended) The apparatus according to [[one of the preceding]] claim[[s]] 1, wherein the longitudinal feed direction [(X)] is substantially perpendicular to the reference surface.

4. (Currently Amended) The apparatus according to [[one of the preceding]] claim[[s]] 1, wherein said reference surface is substantially plane.

5. (Currently Amended) The apparatus according to [[one of the preceding]] claim[[s]] 1, wherein said coupling mechanism includes fulcrum devices [(24)] coupled to the mechanical support [(25)] and to the base [(6)].

6. (Currently Amended) The apparatus according to claim 5, wherein said devices [(24)] define an axis of oscillation that is substantially parallel with respect to the longitudinal feed direction [(X)].

7. (Currently Amended) The apparatus according to claim 6, wherein the fulcrum devices [(24)] are coupled to the mechanical support [(25) in]] such [[a way]] that said axis of oscillation is substantially perpendicular to and substantially coplanar with the trajectory of the light beam [(21)].

8. (Currently Amended) The apparatus according to claim 7, wherein the activation device includes a motor [(26)] with a spindle [(28) with] having an axis of rotation that is substantially parallel with respect to the longitudinal feed direction [(X)], said transmission elements include a connecting rod [(30)] coupled at one end to the mechanical support [(25)] and at the other end to the spindle [(28)] of the motor [(26)], in an eccentric position with respect to the axis of rotation.

9. (Currently Amended) The apparatus according to [[one of the preceding]] claim[[s]] 1, wherein the light beam [(21)] has transverse~~[[al]]~~ dimensions that do not exceed 2 mm.

10. (Currently Amended) The apparatus according to [[one of the preceding]] claim[[s]] 1, wherein the light beam [(21)] is a laser beam.

11. (Currently Amended) A method for checking an elongate tool [(3)], that is substantially arranged along a longitudinal direction [(X)] and includes a free end, by means of an apparatus [(1)] including an emitter [(20)] for generating a light beam [(21)] along a transversal trajectory and a sensor [(22)] for detecting the interruption of the light beam [(21)], a base [(6)], movable along the longitudinal direction [(X)] with respect to the tool [(3)] to be checked, that carries, by means of a coupling mechanism [(24)], said emitter [(20)] and said sensor [(22)], and a transducer device [(9,10)] for checking the mutual position between the base [(6)] and the tool [(3)] to be checked, the method including

[[a mutual feed]] displacing~~[[ement]]~~ along the longitudinal direction, [(X) between]] the movable base [(6) and] relative to the tool [(3)] to be checked, thereby [[for]] causing [[the approach of]] the light beam [(21) towards] to approach the free end of the tool [(3)], and

[[a]] detecting[[on of]] the interruption of the light beam, [[(21)]] in the course of [[this]] said displacing[[ement]] step, when said light beam is interrupted by said free end of the tool,

[[the method is characterized in that the]] wherein oscillations of the light beam [[(21)]] with respect to the base [[(6)]] occur substantially along a [[transversal]] reference surface transverse to said longitudinal direction, and concurrently with the mutual feed displacement, the oscillations being enabled by the coupling mechanism [[(24)]] and being controlled by an activation device [[(26)]].

12. (Currently Amended) The method according to claim 11, wherein said oscillations of the light beam [[(21)]] have a preset frequency, said preset frequency and [[the]] a speed of the mutual feed displacement along the longitudinal direction [[(X) between]] of the movable base [[(6) and]] relative to the tool [[(3)]] are such that [[the]] initial interference between the free end of the tool [[(3)]] and said transverse reference surface causes the interruption of the light beam [[(21)]].

13. (Original) The method according to claim 12, wherein said preset frequency is not less than 10 Hz.

14. (Currently Amended) The method according to [[one of the]] claim[[s]] 11 [[to 13]], wherein the longitudinal direction [[(X)]] is substantially perpendicular to the transverse[[al]] reference surface.

15. (Currently Amended) The method according to claim 14, wherein said oscillations occur about a longitudinal axis that is substantially perpendicular to the trajectory of the light beam [[(21)]] and coplanar with it.

16. (Currently Amended) The method according to [[one of the]] claim[[s]] 11 [[to 15]], further [[including]] comprising:

performing an additional [[mutual]] relative displacement, along the longitudinal direction, $[(X)]$ between the movable base $[(6)]$ and the tool $[(3)]$ to be checked, in a direction opposite with respect to said [[mutual feed]] displacing[[ement]] step, in order to cause the displacement of the light beam $[(21)]$ away from the tool $[(3)]$,

performing a second [[feed]] displacement in the same direction as said displacing step [[at the end of said additional displacement]], said oscillations of the light beam $[(21)]$ with respect to the base $[(6)]$ also occurring in the course of said second [[feed]] displacement, and

performing a second detection of the interruption of the light beam $[(21)]$ during [[this]] said second [[feed]] displacement,

wherein said second [[feed]] displacement has a slower speed $[(V_2)]$ with respect to the speed $[(V_1)]$ of said [[mutual feed]] displacing[[ement]] step.

17. (Currently Amended) The method according to [[one of the]] claim[[s]] 11 [[to 15]], further [[including]] comprising:

performing an additional [[mutual]] relative displacement, along the longitudinal direction, $[(X)]$ between the movable base $[(6)]$ and the tool $[(3)]$ to be checked, in a direction opposite with respect to said [[mutual feed]] displacing[[ement]] step, in order to cause [[the displacement]] movement of the light beam $[(21)]$ away from the tool $[(3)]$, said oscillations of the light beam $[(21)]$ with respect to the base $[(6)]$ also occurring in the course of said additional [[mutual]] relative displacement, and

performing an additional detection of the [[ceasing of the interruption of the]] light beam $[(21)]$ during said additional [[mutual]] relative displacement, wherein said

additional ~~[[mutual]]~~ relative displacement has a slower speed ~~[[(V_2)]]~~ with respect to the speed ~~[[(V_1)]]~~ of said ~~[[mutual feed]]~~ displacing~~[[ement]]~~ step.

18. (New) The apparatus according to claim 1, wherein said reference surface is transverse to said longitudinal feed direction.